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# TAMPA BAY WATER'S MASTER WATER PLAN

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## **INTRODUCTION**

Tampa Bay Water is a special district of the State of Florida, created as a wholesale water supply utility to develop drinking water for the Tampa Bay region. Tampa Bay Water provides water to six member governments including: Hillsborough, Pasco, and Pinellas Counties and the Cities of New Port Richey, St. Petersburg, and Tampa. Through these member governments, Tampa Bay Water provides water to over two million citizens in the Bay area at a total annual average supply of approximately 240 million gallons per day (mgd).

Historically, the region has relied primarily on groundwater from the Floridan Aquifer as a drinking water source, with the exception being the City of Tampa's use of the Hillsborough River. Changing environmental conditions such as lowered lake levels and stressed herbaceous and forested wetlands stirred the region to develop a plan that would reduce the permitted supply capacities of these wellfields. The wellfield permitted capacity was reduced from 192 mgd to 158 mgd in 1998, and is scheduled to be further reduced to 121 mgd by the end of 2002 and then to 90 mgd by the end of 2007. In order to offset these cutbacks and meet future population growth requirements, Tampa Bay Water is developing the Master Water Plan. This plan consists of a diverse array of alternative water supply projects including seawater desalination, brackish water desalination, surface water (including an off-stream reservoir), and some limited additional groundwater. Development of 140 mgd of new and alternative supply projects will allow environmental recovery to our wetland systems and meet our region's projected population growth through 2014.

## **PROJECT DESCRIPTION**

The Tampa Bay Water Board in two separate actions approved the Master Water Plan projects. In November 1998, the Board approved System

Configuration I and in June 2001, the Board approved System Configurations II/III. The location of these projects is depicted on Figure 1.

**System Configuration I** consists of 91 mgd of new supply projects including:

- 60 mgd enhanced surface water system
- 25 mgd seawater desalination plant on Tampa Bay
- 6 mgd groundwater project

The Enhanced Surface Water System will enable the development of surface water from three sources: the Alafia River, high flows from the Hillsborough River and the Tampa Bypass Canal. Since the majority of Florida's rainfall occurs during the rainy season, from June through September, a 15 billion gallon water storage component was included with this system. The Tampa Bay Regional Reservoir will cover approximately 1,200 acres and will be developed as an above-ground off-stream facility. The water use permits issued for the river and canal withdrawals only allow a certain percentage of the flow to be harvested once the flow exceeds a set minimum flow level. During the wet season, harvested flow will be delivered to a 66 mgd surface water treatment plant, and the excess water will be pumped to the reservoir for storage. During dry periods when diminished flows are available from the rivers and canal, flow from the reservoir will be provided to the surface water treatment plant. The surface water treatment plant is being developed utilizing a Design, Build, Operate (DBO) project delivery method. It is projected that the Enhanced Surface Water System will provide a long-term annual average supply of 60 mgd based upon the past 20 years of historic hydrologic conditions.

The Tampa Bay Desalination project will be capable of producing 25 mgd on an annual average basis, with expansion capability of up to 35 mgd in the future. The project will be co-located with an existing power plant that currently processes 1.4 billion gallons per day (bgd) of seawater for cooling purposes. The seawater desalination plant will take 44 mgd from the 1.4 bgd cooling stream, produce 25 mgd of drinking water and return 19 mgd of concentrate for blending with the processed cooling water prior to discharge into Tampa Bay. The project is currently under construction using a Design, Build, Own, Operate, Transfer (DBOOT) development contract.

The 6 mgd of new groundwater supply will be from the Brandon Dispersed Wells project. This project will consist of five new or rehabilitated production

wells in an urban area that was previously used for groundwater production prior to development of regional water supply facilities in that part of the region.

In addition to these supply projects, approximately 72 miles of transmission mains (up to 84-inches in diameter) will interconnect these projects to the existing regional system.

**System Configuration II/III** projects were selected for implementation in June 2001. These projects consist of 49 mgd of new supply that will allow pumping cutbacks to occur in 2007 and meet the region's water supply needs through 2014. These projects include:

- 25 mgd seawater desalination on the Gulf of Mexico (Gulf Coast Desalination)
- 5 mgd of brackish water desalination (Mid-Pinellas Brackish Water Desalination)
- 10 mgd of groundwater (Cone Ranch Wellfield)
- 4 mgd of groundwater (Cypress Bridge II)
- Re-use of 3.5 mgd of industrial process water (Crystals International Water Supply)
- 1 mgd of reclaimed water exchange (Cargill Reclaimed Exchange)
- 0.5 mgd of groundwater (Eagles Wells)
- Hillsborough River augmentation during drought conditions (Morris Bridge Sink)

These projects are in the preliminary design phase and are being developed using alternative project delivery methods, including DBO for the Gulf Coast Desalination and Mid-Pinellas Brackish Water Desalination projects.

## **COST AND FUNDING NEEDS**

The commitment to develop alternative supply projects is not realized without cost implications. The System Configuration I program capital cost is estimated at \$609 million. These costs include the design, permitting, property acquisition, and construction cost of new facilities. A partnership agreement with the Southwest Florida Water Management District (State Agency) was developed in 1998 to provide \$183 million of co-funding. In return, Tampa Bay Water committed to reduce groundwater pumping as previously

referenced. An additional \$57 million is anticipated from the United States federal government through congressional allocations for the Tampa Bay Regional Reservoir project. The remaining \$369 million will be funded through a series of utility bond issuances. The member governments fund the debt service for the bond issues as well as the operating and maintenance cost of Tampa Bay Water through the Agency's annual budget based upon the volume of water delivered to each respective member and a unitary wholesale water rate.

The System Configuration II/III projects are estimated to have a capital cost of approximately \$700 million. Of this cost, \$327 million is an estimate for the Gulf Coast Desalination project, which includes \$123 million for offshore pipelines, should environmental studies determine them necessary to collect source water and discharge concentrate. The Tampa Bay Water Board of Directors, at its September 2001 meeting, directed staff to pursue state and federal co-funding opportunities for these projects.

Tampa Bay Water's unitary wholesale water rate is currently set at \$1.49 per thousand gallons. It is expected that by 2008, the water rate will exceed \$2.50 per thousand gallons. The additional cost of alternative water supply projects and the continued payment of debt service for unused wellfield facility capacity are primary factors of the rate increase.

## **DESIGN AND CONSTRUCTION HIGHLIGHTS**

The design phase of the Master Water Plan was conducted with significant input from the public. Over 50 public meetings were held to inform the public of the Master Water Plan goals, provide status updates, and collect public input on project development concepts. Examples of public input include:

- Suggestion of a 435-acre parcel of property that was ultimately purchased by Tampa Bay Water to site facilities, including the surface water treatment plant, the groundwater treatment plant, and a high service pumping station;
- Development of alternative pipeline routes;
- Aesthetic design of surface water intake facilities to blend with the surrounding environment.

The design of large diameter pipeline facilities also presented a challenge to the design teams. Traversing both urban and rural areas, the pipeline projects were aligned along existing roadways, utility corridors and property boundaries to minimize encroachment upon private properties and environmentally sensitive wetland areas. Establishment of accurate existing underground utility locations was key in defining the construction requirements along the pipeline routes totaling 72 miles in length. This was especially critical in design of the 54 pipeline tunnels. The construction of these tunnels within overlapping and relatively short construction time periods created a resource challenge for the project teams. The alternative tunneling methods used included: micro tunneling, jack and bore, pipe ramming, hand excavations using tunnel liner plates, and a “ribs and lagging” method. The two-year drought that existed through June 2001 was a factor during the construction process. Although less de-watering was required for the underground pipeline construction, the dry sandy soils created unique challenges for the tunneling operations. A technique that seemed to mitigate roadway surface settlement problems was using compaction grouting ahead of the tunneling operation.

The 66 mgd surface water treatment plant is the first project implemented by Tampa Bay Water using the DBO project delivery method. The key design issue involved creating a balance of performance and technical requirements in the DBO request for proposals (RFP). Creating more of a performance-based specification in the RFP seemed to present greater opportunity for creative “out of the box” ideas. This approach resulted in a very cost effective and technically sound design.

## **IMPLEMENTATION TIMELINE**

Timing was perhaps the most critical aspect of the Master Water Plan. Tampa Bay Water’s commitment to reduce groundwater pumping by December 31, 2002, was an extraordinary challenge considering the projects were not selected for implementation until November 1998. The program team had only four years and one month to complete design, obtain 237 environmental/construction permits, secure 190 parcels of property, bid and construct the projects.

To meet the challenge, Tampa Bay Water structured the engineering consulting services agreements to include all design services, all permitting services, property surveying, title work, appraisals, land agent services, and bidding

services. Time delays due to information exchange problems were minimized by consolidating these responsibilities into individual contracts. A time scheduling consulting firm was also retained to develop, monitor, and update project time schedules, which included a total of 10,300 tasks for the entire program. Monthly updates reports were prepared including summary time schedules, permitting status tables, property acquisition status tables, and budget status spreadsheets.

In addition, the project teams met collectively on a bi-weekly basis to review project status, identify key schedule risk issues, and develop schedule delay mitigation plans.

## **PROJECT MANAGEMENT PLAN**

The program team was developed with communication being the main objective. Figure 2 is a summary chart of the organizational structure. Since Tampa Bay Water has only 119 employees, the time scheduling, system engineering, project engineering, construction, and construction management services were outsourced. The program manager, individual project managers, construction manager, and construction specialists were Tampa Bay Water employees.

Key program management assistance is provided by the following consulting teams:

- Jacobs Engineering – assist with time schedule, budget management, program schedule trouble shooting, and construction management of Tampa Bay Desalination project
- Black and Veatch – serve as system engineer to coordinate overall system technical, intergovernmental relations, procurement support, and value engineering
- Hill/Morrison Knudsen Joint Venture – provide construction management services on northern projects
- Construction Dynamics Group/Parsons Brinkerhoff – provide construction management services on southern projects

Communication during the construction phase is enhanced by conducting weekly breakfast meetings between Tampa Bay Water's program manager, construction manager, construction specialists, and representatives from each of the above-referenced firms.

## **ECONOMIC IMPACTS OF THE MASTER WATER PLAN**

A macro-economic impact study of the Master Water Plan was conducted by the Tampa Bay Regional Planning Council to analyze the impact of facility construction and operation on the region's economy. The study also estimated the economic impact if the Plan is not implemented and a water supply shortage were to occur.

For background purposes, in 1998 the estimated Gross Regional Product for the region was \$55.6 billion with approximately 1.3 million jobs. These measures represent approximately 15 percent of the State of Florida total.

The study revealed that severe negative economic consequences will exist if the Plan is not implemented. It was predicted that the region could potentially lose more than 11,000 jobs and more than \$5 billion in Gross Regional Product if a water supply deficit is experienced.

It was also determined that the Plan has a positive economic impact on the region, creating approximately 900 permanent jobs and generating between \$548 and \$569 million in Gross Regional Product over 10 years. It was also predicted that during the outlying years, the Plan would have some slight negative impacts due to consumers spending more for water and less for goods and services.

Clearly, the Master Water Plan is an essential component of the infrastructure necessary to improve environmental conditions and sustain the economic viability of the Tampa Bay region.